

Amendment and Response

Serial No.: 09/942,200

Confirmation No.: 8194

Filed: August 29, 2001

For: DIFFUSION BARRIER LAYERS AND METHODS OF FORMING SAME**Remarks**

The Office Action of 17 May 2005 has been received and reviewed. With claims 23, 27, 30, 32, 33, 34, and 37 having been amended, the pending claims remain claims 23-39 and 41-49. Reconsideration and withdrawal of the rejections are respectfully requested for at least the reasons set forth below.

Claim Amendments

Claims 23, 27, 32, and 37 have been amended to recite a "simultaneously co-deposited" platinum(x): ruthenium alloy. Claims 23 and 37 have further been amended to recite a "conformal" barrier layer.

Simultaneous co-deposition is supported in the specification at, for example, page 7, lines 16 to 27, and page 8, lines 22-24. The recitation of conformal layers is supported, for example, at page 14, lines 21-24.

Prosecution History

Applicant notes the Notice of Allowance of 10 December 2004, which allowed claims 23-29 and 41-49 in light of the arguments provided by Applicant on 1 November 2004. Furthermore, Applicant notes that Wolters et al. (U.S. Patent No. 5,744,832), which is utilized in the current rejections, was provided by Applicant in the Information Disclosure Statement (IDS) filed on 7 February 2002, shortly after the present application was filed.

Applicant filed a Request for Continued Examination (RCE) and an accompanying supplemental Information Disclosure Statement (IDS) on 9 March 2005. The RCE did not include any amendments to the claims. The current rejections put forward by the Examiner do not make use of any of the newly-cited art presented in the supplemental IDS. Rather, the current rejections are based on Wolters et al. (previously considered) alone and in combination with new art cited by the Examiner.

While Applicant believes that the claims pending prior to the present Office Action are allowable over the cited art, the claims have been amended to move the application forward.

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"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

M.P.E.P. § 2131, citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Claims 23, 26-28, 30-35, 37-38, 42, 44-45, and 47 were rejected under 35 U.S.C. § 102(b) as being anticipated by Wolters et al. (U.S. Patent No. 5,744,832). Wolters et al. discloses a "semiconductor body 3 . . . on which a capacitor 2 forming a memory element is present with a lower electrode 11, an oxidic ferroelectric dielectric 12, and an upper electrode 13[,] which lower electrode 11 makes electrical contact with the conducting region 5 and comprises a layer 112 with a conductive metal oxide and a layer 111 comprising platinum." Col. 4, lines 59-67. The Office Action argues that Wolters et al. anticipates Applicant's invention, and further asserts that "the term 'chemical vapor deposited' is merely product by process and therefore does not structurally distinguish from Wolters et al. herein." *Office Action*, page 2. Applicant respectfully traverses this rejection.

Wolters et al. discloses a two layer oxygen barrier, and notes that "both the ruthenium/platinum 75/25 layer and the platinum/ruthenium 85/15 layer play a part in blocking the oxygen diffusion" (col. 7, lines 13-16). However, there is no teaching identified in Wolters et al. of a layer in which platinum and ruthenium are simultaneously co-deposited. Rather, one layer is deposited over the other (see, e.g., col. 6, lines 9-11 of Wolters et al.: "[t]wo sputtering sources are used here, which deposit alternately a ruthenium layer and a platinum layer").

Independent claims 23, 27, 32, and 37, on the other hand, each recite a barrier layer of a simultaneously co-deposited platinum(x):ruthenium alloy. No disclosure is identified in Wolters et al. of a platinum(x):ruthenium layer that is co-deposited as recited by these claims. Applicant thus asserts that claims to a barrier layer formed of a simultaneously co-deposited platinum(x):ruthenium alloy are not anticipated by Wolters et al. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

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To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

M.P.E.P. §2143.

Claims 41 and 46

Claims 41 and 46 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolters et al. in view of Bronner et al. (U.S. Patent No. 6,177,696). Applicant does not admit that Bronner et al. is prior art and reserves the right to swear behind this document at a later date.

The Office Action states that Wolters et al. discloses substantially all the structure in the claimed invention, "except a substrate assembly comprising a small high aspect ratio opening." *Office Action*, page 5. For this teaching, the Office Action relies on Bronner et al.

Claims 41 and 46 depend from independent claims 23 and 37, respectively, and thus include all the limitation of their respective base claims. Applicant submits that Wolters et al. fails to teach, or even suggest, the limitations of these claims based upon the remarks already provided above (i.e., a Wolters et al. fails to teach or suggest formation by simultaneous co-deposition). Nothing is identified in Bronner et al. that remedies this deficiency.

Moreover, claims 23 and 37 (from which claims 41 and 46 respectively depend) recite "a conformal chemical vapor deposited barrier layer" (claim 23), and "a conformal barrier layer" (claim 37). There is no disclosure or suggestion identified within Bronner et al. that its HSG silicon process is conformal. Moreover, there is no identification that the deep trench HSG process of Bronner et al. could even be combined with the oxygen barrier layer processes of Wolters et al.

Page 9 of 11

Amendment and Response

Serial No.: 09/942,200

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As neither reference discloses or suggests a conformal layer formed of a platinum(x):ruthenium alloy, Applicant respectfully traverses the rejection and asserts that claims 41 and 46 are patentable over Wolters et al. in view of Bronner et al.

Claims 43 and 48

Claims 43 and 48 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolters et al. in view of Akram (U.S. Patent Publication No. US 2002/0056863 A1, now issued as U.S. Patent No. 6,541,812). Although Applicants do not agree with the substance of the rejection, it is rendered moot by the remarks presented below. Moreover, Applicants reserve the right to substantively traverse any rejection made in connection with these documents at a later date.

The present application is a divisional application of U.S. Patent Application Serial No. 09/146,866 (filed 3 September 1998), now issued as U.S. Patent No. 6,323,081. As a result, the present application is entitled to a 3 September 1998 priority date. Akram was filed 19 June 1998, and published 16 May 2002. As a result, Akram is considered prior art only under subsection (e) of 35 U.S.C. § 102.

Applicant respectfully submits that Akram is not prior art in view of 35 U.S.C. § 103(c). 35 U.S.C. § 103(c) provides that "subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

The present application is assigned to Micron Technology, Inc., as evidenced by the assignment recorded in the parent case at reel/frame 009444/0308. Akram is also assigned to Micron Technology, Inc., as evidenced by the assignment recorded at reel/frame 009272/0392. It is furthermore submitted that, at the time the invention of the instant application was made, the claimed invention and Akram were owned by (or subject to an obligation of assignment to) the same entity.

Amendment and Response

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Accordingly, Applicant submits that the rejection under 35 U.S.C. § 103(a) based on Wolters et al. in view of Akram is rendered moot because Akram is not prior art under 35 U.S.C. § 103(a) in view of 35 U.S.C. § 103(c). More specifically, because Akram qualifies as prior art only under subsection (e) of 35 U.S.C. § 102, it may be excluded as prior art for obviousness purposes for the reasons set forth above. Reconsideration and allowance of the claims are respectfully requested.

Claims 24, 25, 29, 36, 39, and 49

Dependent claims 24, 25, 29, 36, 39, and 49 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolters et al. (U.S. Patent No. 5,744,832). More specifically, the Office Action asserts that, although Wolters et al. "does not teach that x is about 0.90 to about 0.98 . . . it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wolters et al. by having x being about 0.90 to about 0.98." *Office Action*, page 6.

To support this assertion, the Examiner cites *In re Aller*, 105 USPQ 233, which holds that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. Applicant respectfully disagrees that Wolters et al. renders claims 24, 25, 29, 36, 39, and 49 obvious.

First, the claims each recite simultaneous co-deposition of platinum(x):ruthenium, which is not taught or suggested by Wolters et al. Thus, it is submitted that Wolters et al. fails to teach or suggest all the claim recitations as required for *prima facie* obviousness.

Further, the ranges disclosed by Applicant are clearly outside the range disclosed by Wolters et al., and Wolters et al. provides no motivation to depart from its disclosed range of x being 85% or less. In fact, Wolters et al. teaches away from Applicant's claimed range when it states that both the 85/15 platinum/ruthenium layer and the 75/25 ruthenium/platinum layer play a part in blocking oxygen diffusion (see col. 7, lines 11-17).

For these and other reasons, it is submitted that claims 24, 25, 29, 36, 39, and 49 are neither taught nor suggested by Wolters et al. Reconsideration and withdrawal of the rejection are, therefore, respectfully requested.

Page 11 of 11

Amendment and Response

Serial No.: 09/942,200

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It is submitted that pending claims 23-39 and 41-49 are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicant's Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted for
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CERTIFICATE UNDER 37 CFR §1.8:

The undersigned hereby certifies that the Transmittal Letter and the paper(s), as described hereinabove, are being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to **Mail Stop Amendment**, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 15th day of September, 2005, at 1:18 PM (Central Time).

By: Sara E. WiganName: Sara E. Wigan